

APION (TRICHAPION) CANDYAE, NEW SPECIES
(COLEOPTERA: CURCULIONIDAE), A GALL-MAKER
ON LEAF PETIOLES OF *ERYTHRINA BERTEROANA*
URBAN (FABACEAE) IN EL SALVADOR

DONALD R. WHITEHEAD

Systematic Entomology Laboratory, IIBIII, Federal Research,
Science & Education Administration, USDA¹

ABSTRACT

Apion (Trichapion) candyae, new species (San Vicente, El Salvador), forms galls on leaf petioles, petiolets, and midveins of *Erythrina berterioana* Urban. A member of a poorly understood complex including many species with striking secondary sexual modifications, *A. candyae* is particularly rich in such modifications. An attempt to determine precise relationships by comparisons of characteristics mentioned in published descriptions failed, because the data matrix was insufficiently rich in usable specializations—i.e., derived characteristics shared among 2 or more taxa. However, presently available data indicate that the narrowest interpretation is of shared ancestry with the Mexican *A. sleeperi* Kissinger, another species with numerous bizarre male specializations. With some reservations, these 2 species are retained in the *nigrum* group of the subgenus *Trichapion*.

Among numerous tropical American weevils submitted by agronomists to the Systematic Entomology Laboratory for identification, an unusually elegant and obviously undescribed species of *Apion* was represented by 2 small samples from a major pinto bean growing region in El Salvador. Upon inquiry, however, I learned that this species is not a pest of these beans, but rather a gall maker on another commercially exploited legume.

IDENTIFICATION CHARACTERISTICS OF *A. candyae*

At present, no keys exist for identification of *Apion* females of Central America, and females of *A. candyae* therefore can be confidently recognized only by association with males.

Males of *A. candyae* trace readily to the subgenus *Trichapion* in Kissinger's key to subgenera (1968:256), and they are easily distinguished from all other *Apion* by the following set of secondary sexual characteristics: Middle tibia mucronate; antennal funicle and front tibia ciliate; and front and middle femora enlarged. Kissinger's key to species of *Trichapion* (168:117) will distinguish *A. candyae* by modification of couplet 6:

- | | | |
|----|---|----------------------------|
| 6. | Antennal funicle and front tibia ciliate; front and middle femora swollen | <i>A. candyae</i> , n. sp. |
| — | Combination of characters not as above | 6a |

¹Mail address: c/o U. S. National Museum, Washington, D. C. 20560.

- 6a. Basal segment of front tarsus elongate, ciliate beneath.....
 — Basal segment of front tarsus neither elongate nor ciliate beneath 7

Apion (Trichapion) candyae Whitehead, **new species**
 (Fig. 1)

Type-material. Holotype male (USNM #75078) and 6 paratypes labelled "EL SALVADOR San Vicente on beans (71-11329)"; 3 paratypes labelled "SALV. San Vicente, on Pito (legume) 72-12588". In U.S. National Museum of Natural History; some paratypes will be distributed to other museums.

Comments. Dr. Floyd Smith (pers. comm.) informed me that "Pito" might be a transcription error for "Pinto," since pinto beans are a major crop grown in the vicinity of San Vincente. However, Ing. Agr. José Enrique Mancía C. (pers. comm.) states that *A. candyae* forms galls on leaf petioles and midveins of a different kind of legume, *Erythrina berteroana* Urban (locally called "pito" or "quelite"), and that larvae and pupae are parasitized by *Triaspis* sp., a braconid. Except for one species that develops in female willow aments and two that are stem borers of Compositae, *Apion (Trichapion)* larvae develop mainly in fruits and flower buds of various legumes (Kissinger 1968), and discovery of gall-making is most unexpected.

Standley and Calderón (1925) reported that *Erythrina rubrinervia* H.B.K. is exploited in El Salvador, the young flowers and leaves used to flavor various kinds of foods during preparation. The name *E. rubrinervia*, however, is not correctly applied; according to Krukoff and Barneby (1974), the proper name for the species is *E. berteroana*.

I examined all specimens of Central American *Erythrina* in the U.S. National Herbarium, and I found that Standley's collections of *E. rubrinervia* from El Salvador have been reidentified as *E. berteroana* by Krukoff. On one of these specimens, Standley had noted that flowers may be fried with eggs or boiled and that leaves may be cooked with beans. None of the plant specimens examined had evidence of galls or any other evidence of *Apion* infestation.

Description. Length 2.55-2.90 mm; width 1.22-1.26 mm. Body (fig. 1) of average form; entirely black, elytra with faint bluish luster; vestiture white, fine, sparse, nearly uniform above, condensed laterally on venter of head and thorax. Male beak (figs. 2, 5) 0.97-1.00 x length of pronotum; in side view feebly curved, slightly tapered toward apex, with prominent ventral lamella between antennal insertions; in dorsal view moderately expanded toward antennal insertions, sides nearly parallel in apical 1/3; dorsal surface alutaceous and coarsely punctate in basal 4/5, polished and minutely punctate in apical 1/5, vestiture conspicuous. Female beak (figs. 4, 6) 1.17-1.19 x longer than pronotum; in side view nearly parallel and strongly arcuate in apical 1/2, without ventral lamella between antennal insertions; in dorsal view strongly expanded at antennal insertions; dorsal surface minutely punctate, vestiture inconspicuous. Antenna of male inserted at basal 0.31-0.33 of beak, at distance in front of eye 1.3-1.4 x greater than width of frons; antenna of female inserted at basal 0.21-0.24 of beak, at distance in front of eye 1.0-1.2 x greater than width of frons; dorsal margin of scrobe of male slightly oblique posteriorly, of female nearly evenly descending. In dorsal view, eye moderately prominent, eye of male proportionately large (0.54-0.55 x as long as beak), eye of female smaller (0.33-0.34 x as long as beak); frons 1.5-1.6 x as wide as apex of beak, with long, deep median sulcus bordered on each side by 1 or 2 rows of coarse punctures; in profile, dorsal margin of head strongly convex above eye, strongly declivitous behind; ventral surface of head (fig. 3) with lateral ridges low, obscured by dense vestiture. *Prothorax*

at base 1.08-1.14 x wider than long, apex 0.65-0.69 x wide as base; in dorsal view sides parallel behind middle, apex strongly constricted, base strongly flanged; in side view dorsal margin feebly convex; on dorsal surface punctures 0.03-0.04 mm in diameter, shallow, bearing scales 0.05-0.06 mm long, interspaces much wider than diameter of punctures, coarsely alutaceous; basal fovea shallow, broad. *Scutellum* long, triangular, acute. *Elytra* at humeri 1.43-1.46 x wider than prothorax at base, 2.62-2.70 x longer than pronotum, 1.62-1.70 x longer than wide; intervals at middle about twice as wide as striae, moderately convex; intervals 1-3 with 2 partly confused rows of scales, intervals 4-9 with single row of scales, scales of intervals about 0.04 mm long, scales of striae punctures about 0.03 mm long; intervals 7 and 9 with long specialized seta toward apex; striae deep, moderately coarse, not sharply defined, on apex join 2+9 (or 1+2+9)-(3+4)+(7+8)-5+6, no pits at striae junctures. *Male characters*: tibia 2 with long, prominent mucrone (fig. 7); beak with prominent ventral lamella; antenna, front tibia, and front femur with long ventral cilia; front and middle femora moderately swollen; appendages elongate, hind femur extended far beyond elytral apex. *Phallus* (figs. 8, 10) in side view moderately convex, apex abruptly produced ventrally; in dorsal view sides tapered from base to apex; internal sac without conspicuous armature; posterior apophyses 0.40-0.48 x as long as rest of median lobe. Paramere (fig. 9) moderately long, moderately slender; apical lobes long; without macrotrichia; transverse clear areas broadly continuous medially; with short, slender lateral articulation to basal piece; basal median area produced, feebly crested.

Dedication. I am pleased to name this species after Candy Feller, in thanks and appreciation for preparing many fine illustrations to grace my technical contributions.

EVOLUTIONARY CONSIDERATIONS

Attempts to determine precise cladistic relationships of *A. candyae* proved fruitless. This species seems to be most closely related to *A. sleep-eri* Kissinger and, accordingly, is tentatively assigned to the *nigrum* group of the subgenus *Trichapion* (see Kissinger 1968). This conclusion and attendant problems are discussed below.

Kissinger assigned 114 North and Central American *Apion* species to the subgenus *Trichapion*, all having at least 1 male secondary sexual character: Middle tibia mucronate. In most species, the front and/or hind tibiae are also mucronate; moreover, many species have additional male secondary sexual characters, some of them extraordinarily distinctive. Males of *A. candyae* have only the middle tibia mucronate but have an unusually large suite of other secondary characters.

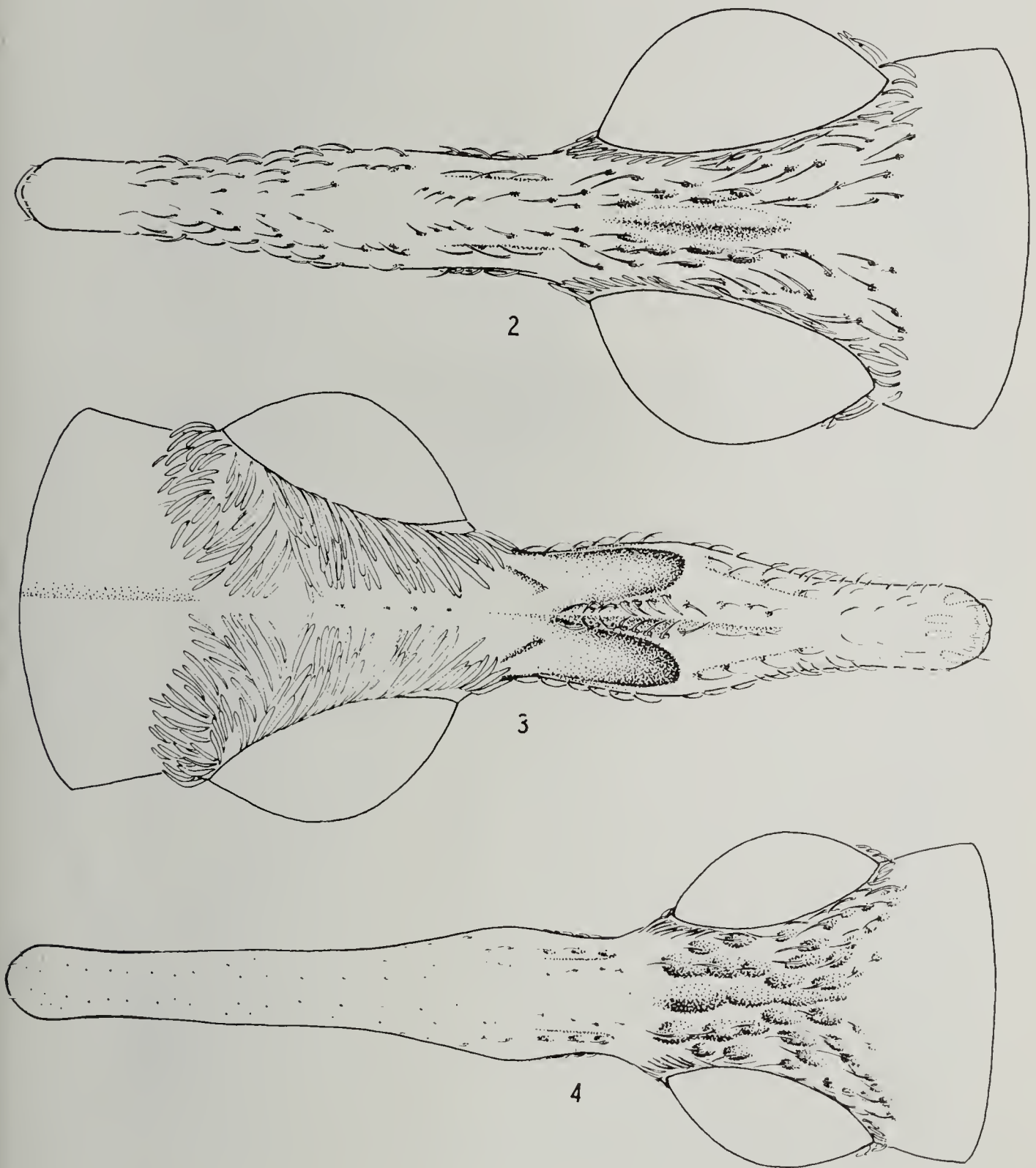
Kissinger divided the subgenus into the *aurichalceum* and *patruelle* sections, characterized thus: (1) vestiture usually dense *versus* sparse; (2) elytra usually with 2 or more specialized setae *versus* only 1 seta; (3) ventral lateral ridges of rostrum generally strongly developed *versus* feebly developed; and (4) paramere generally without *versus* with macrotrichia. *A. candyae* has sparse vestiture, 2 specialized elytral setae, feeble ventral lateral ridges on the rostrum, and no macrotrichia on the paramere—thus having 2 characteristics in common with each section.

Three species groups contain species with males having only the middle tibia mucronate: *spinitarse* group (*aurichalceum* section), 10 (of 18) species; *punctulirostre* group (same section), 3 (of 3) species; and *nigrum* group (*patruelle* section), 1 (of 15) species. Relationships within and among these 3 species groups are unclear, and the 2 larger groups probably are not natural assemblages. Only these 3 groups are considered here, because *A. candyae* shares known apotypic character states with no members of other species groups.



Fig. 1, *Apion candyae*, habitus view of male.

From Kissinger's species descriptions, the only character systems that can be readily analyzed for all pertinent species involve reduction sequences for the specialized elytral setae and the male tibial mucrones, plus various apotypic male secondary sexual characteristics. A full analysis by numerical cladistics (*sensu* Willis 1971) cannot be made from these characters because no sufficiently rich data matrix can be generated. This is because some species lack apotypic states and because many of the apotypic states pertain only to single species; in other words, suitable character-distribution patterns are too few for fruitful comparisons.



Figs. 2-4, *Apion candyae*, head and rostrum; 2, male, dorsal; 3, male, ventral; 4, female, dorsal.

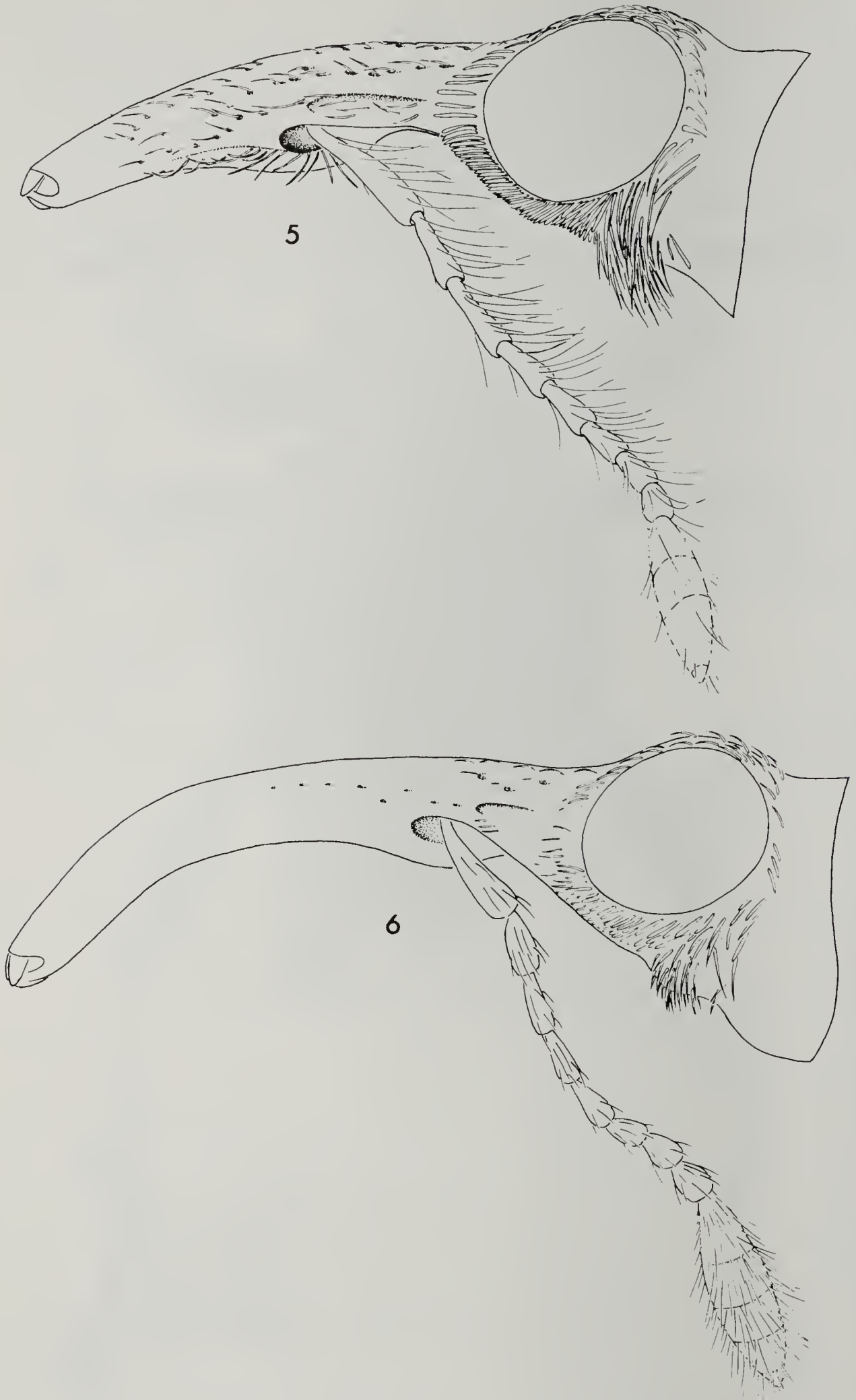


Fig. 5-6, *Apion candyae*, head and rostrum; 5, male, lateral; 6, female, lateral.



7



8



9



10

Figs. 7-10, *Apion candyae*, male structures: 7, middle tibia, posterior aspect, showing mucrone; 8, male genitalia, lateral; 9, paramere, ventral; 10, male genitalia, ventral.

In *Trichapion*, reduction sequences for the specialized elytral setae probably represent 2 character systems. Many species representing various species groups have minute setae on interval 3; absence is interpreted as a reduction, but this character is so difficult to interpret that I regard it as unusable. A more promising situation exists for the larger specialized setae of intervals 7 and 9. I consider as plesiotypic the presence of 1 seta each on intervals 7 and 9, with reductions to presence of only 1 seta per elytron as apotypic. This interpretation may be oversimplified because some species may have an extra seta (which I tentatively regard as adventive or apotypic) and because no detailed analysis of setal positions has been made; there may or may not be a more complex system of elytral chaetotaxy than interpreted here. Moreover, the character system is not completely satisfactory for cladistic analysis because (a) the setae are difficult to observe and are subject to abrasion, hence may not have been accurately described for all species; (b) presence or absence may vary within species; and (c) the reduction sequences are not restricted to this part of the genus. In having the plesiotypic condition of setae on intervals 7 and 9, *A. candyae* agrees with *A. sleeperi* of the *nigrum* group and most members of the *spinitarse* and *punctulirostre* groups.

Reduction sequences for male tibial mucrones in *Trichapion* are from mucrones present on all 3 tibiae, through present on either tibiae 1 and 2 or tibiae 2 and 3, to present on tibia 2 only. In some instances, the mucrone of tibia 1 is relatively small and may represent a reversal. However, the extreme of having only tibia 2 mucronate is clearly apotypic, and in this respect *A. candyae* agrees with *A. sleeperi* of the *nigrum* group, all species of the *punctulirostre* group, and more than half of the species of the *spinitarse* group.

Among the other secondary male sexual characters, some are autapotypic in single species and thus of no use for assessing relationship. Others are apotypic in single species of 2 different species groups but do not coincide with apotypic states for other characters, and these also are of little use for cladistic analysis. Other characteristics are apotypic in several species within a species group and do tend to overlap with one another, so that these are of potential use for cladistic analysis. *A. candyae* and *A. sleeperi* have such characteristics in common only with one another and with *A. heterogeneousum* Sharp of the *nigrum* group: Ciliate antenna (all 3 species); ciliate tibia 1 (*A. candyae*, *A. heterogeneousum*); elongate appendages (*A. candyae*, *A. sleeperi*); and swollen femora 1 and 2 (*A. candyae*, *A. sleeperi*).

In summary, *A. candyae* and *A. sleeperi* both have an exceptionally large number of secondary sexual characteristics, and apotypic states of 4 of these are shared and presumed to be synapotypic. I therefore presume that these 2 species shared a common ancestor to the exclusion of other described species. They tentatively are assigned to the *nigrum* group for the following 2 reasons: (1) the only apotypic condition shared with members of the *spinitarse* and *punctulirostre* groups is mucrone number, and this condition appears to have been independently derived; and (2) certain specialized conditions are shared with *A. heterogeneousum* of the *nigrum* group, and these may be synapotypic.

Natural history data may prove to be a rich, untapped source for evolutionary comparisons. Unfortunately, no such information is presently available for any members of the *spinitarse* or *punctulirostre* groups. Lar-

vae of several members of the *nigrum* group are known to develop in pods of various legumes, but natural history data are lacking for *A. sleeperi* and *A. heterogeneousum*, the two species thought to be most closely related to *A. candyae*.

In conclusion, data on *Apion* are inadequate, and certain character systems that might seem suitable for cladistic analysis are insufficient. Indeed, this is one reason why *Apion* is such an enormous genus; nobody has yet discovered suitable means to divide it into discrete, natural groups. External structural characteristics and male genital characteristics have been examined in some depth, but to resolve questions of relationships it will be necessary to survey for other kinds of character systems.

ACKNOWLEDGEMENTS

For helpful advice, comment, or criticism, I thank G. E. Ball (University of Alberta), R. C. Barneby (New York Botanical Garden), W. E. Clark (Smithsonian Institution), J. E. Mancía C. (Universidad de El Salvador), E. F. Smith (Federal Research, Science and Education Administration), and J. M. Kingsolver, G. C. Steyskal, R. W. Hodges, and D. R. Smith (Systematic Entomology Laboratory).

LITERATURE CITED

- KISSINGER, D. G. 1968. Curculionidae subfamily Apioninae of North and Central America, with reviews of the world genera of Apioninae and world subgenera of *Apion* Herbst (Coleoptera). Taxonomic Publications, South Lancaster, Mass., vii + 559 p.
- KRUKOFF, B. A. AND R. C. BARNEBY. 1974. Conspectus of species of the genus *Erythrina*. Lloydia 37:332-459.
- STANDLEY, P. C. AND S. CALDERÓN. 1925. Lista preliminar de las plantas de El Salvador. Tipografía La Union, Dutriz Hermanos, San Salvador, 274 p.
- WILLIS, H. L. 1971. Numerical cladistics: The *Ellipsoptera* group of the genus *Cicindela*. Cicindela 3:13-20.



THE COLEOPTERISTS SOCIETY

Minutes of Annual Meeting

The 10th annual meeting of the Coleopterists Society was held November 28, 1977, at the Sheraton Hotel in Washington, D.C., in conjunction with the national meetings of the Entomological Society of America. The meeting was chaired by President Allen who welcomed members and called the meeting to order.

1. Minutes of 1976 meeting were accepted as published in the Bulletin, Vol. 31(3), 1977.

2. Secretary Gordon reported to the membership on business discussed at the executive committee meeting held earlier, as follows. *Associate editor*.—It was proposed that an associate editor be appointed to assist Don Whitehead; this proposal was voted on and accepted. *Delinquent members*.—Terry Erwin requested permission to drop members delinquent in payment of dues; this request was approved. *Association of Systematic Collections*.—Gordon informed the committee that the Coleopterists Society has been accepted for membership in the ASC.